

# 1701 - BEARINGS AND PADS FOR STRUCTURES

## SECTION 1701

### BEARINGS AND PADS FOR STRUCTURES

#### 1701.1 DESCRIPTION

This specification covers the following types of pads and bearings for use on bridge seats:

- Plain Elastomeric bearing pads are non-reinforced pads consisting of elastomer only.
- Steel reinforced elastomeric bearings consist of layers of elastomer restrained at their interfaces by bonded, non-elastic laminates. Provide bearings with the dimensions, material properties, elastomer grade and type of laminates shown in the Contract Documents.
- Polytetrafluoroethylene (PTFE)/elastomeric bearings consist of a stainless steel sliding plate and a steel reinforced elastomeric bearing. Bond a stainless steel or structural steel back-up plate to the top of the steel reinforced elastomeric bearing. Bond the other side of the back-up plate with a layer of teflon.
- Steel bearings consist of rocker, roller and sliding bearings.
- Pot and disc bearings consist of a circular, non-reinforced neoprene, elastomer, or rubber pad, of relatively thin section. For a pot bearing, this pad is confined and sealed in a steel pot or hydraulic cylinder. For a disc bearing, this pad is not confined.
- Spherical bearings consist of bearing with spherical elements for unidirectional deflection rotation.

#### 1701.2 REQUIREMENTS

**a. General.** Use only one type of pad throughout any one structure, unless otherwise noted in the Contract Documents.

Provide the type(s) of bearings shown in the Contract Documents.

Provide pads or bearings that comply with the Bearings section requirements of AASHTO's LRFD Bridge Design Specifications and LRFD Bridge Construction Specifications.

**b. Plain Elastomeric Pads.** Provide a virgin neoprene (Polychloroprene) pad. A Shore A Durometer hardness of  $60 \pm 5$  and an AASHTO low temperature grade 3 elastomer is required, unless shown otherwise in the Contract Documents. Leveling pads used in Continuous Prestressed Beam Bridges are exempt from the low temperature grade requirements.

**c. Steel Reinforced Elastomeric Bearings.** Except as modified by the material, testing and acceptance requirements of this specification, provide steel reinforced elastomeric bearings that satisfy the requirements of AASHTO M 251.

Provide a virgin neoprene (polychloroprene) elastomer. A Shore A Durometer hardness of  $60 \pm 5$  and an AASHTO low temperature Grade 3 elastomer is required, unless shown otherwise in the Contract Documents.

Provide laminates for the bearings that comply with ASTM A 36, AASHTO M 270 (ASTM A 709) Grade 36, ASTM A 1011 SS Grade 36 or A 1008 SS Grade 40, unless otherwise specified in the Contract Documents.

Refer to the Contract Documents for the design method used:

(1) For steel reinforced elastomeric bearings designed using Design Method A, provide bearings that conform to and are tested according to the requirements of AASHTO M 251, sections 8.6 and 8.8.2, and Appendices X1 and X2. The testing requirements of section 8.8.1 will apply if a maximum value for compressive strain is shown in the Contract Documents. Follow the test procedure described in section 8.8.2, except load the sampled bearing to 1500 psi.

(2) For steel reinforced elastomeric bearings designed using Design Method B, provide bearings that conform to and are tested in accordance with AASHTO M 251, sections 8.6 and 8.8, including the shear modulus test of section 8.8.4. Report the test method used to determine shear modulus. The testing requirements of section 8.8.1 will apply if a maximum value for compressive strain is shown in the Contract Documents. Report the percent creep at 25 years (section 8.8.3) if an allowable value is shown in the Contract Documents. Follow the test procedure described in section 8.8.2, except load the sampled bearing to 2400 psi.

For sampling and testing of finished bearings, a lot is defined as being of the same size, thickness, design, and type - manufactured in a reasonably continuous manner for a single bridge.

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**d. PTFE/Elastomeric Sliding Bearings.** Provide an elastomeric portion satisfying **subsection 1701.2(c)**.

Provide a sliding surface for the PTFE that is chromium-nickel stainless steel sheet or plate that complies with ASTM A 240, UNS S31600 or UNS S30400. Polish the surface to an 8 micro-inch RMS (#8 mirror) finish.

Provide special bearing quality polytetrafluoroethylene (PTFE) unfilled sheets having a static loading coefficient of friction of not more than 0.03 at a bearing pressure of 3.0 ksi or greater and a temperature of 68°F.

**e. Steel Bearings.** Face the bearing surfaces of the bearings as required by **DIVISION 700**.

When specified on the Contract Documents, provide structural steel that is hot dip galvanized in accordance with ASTM A 123.

When specified on the Contract Documents, paint the surfaces of the bearings as required by **DIVISION 700**.

**f. Pot Bearings.** Provide an elastomeric portion satisfying **subsection 1701.2c**, except that the nominal hardness will lie between 50 and 60 on the Shore A scale. Fabricate the pot and piston of structural steel that complies with AASHTO M 270 Grade 36, 50 or 70 as shown in the Contract Documents. Do not use weathering steel for any of these components. Provide brass seal rings that comply with ASTM B 36 for rectangular cross-sections or Federal Specification QQB62 Composite 2 for circular cross-sections.

**g. Disc Bearings.** Provide PTFE and stainless steel materials satisfying **subsection 1701.2d**. Construct disc from polyether urethane with a Shore A Durometer hardness of  $55 \pm 10$ . Provide steel satisfying **subsection 1701.2f**. Do not use weathering steel for any of these components. Design and use materials consistent with limitations and criteria from AASHTO's "LRFD Bridge Construction Specifications".

**h. Spherical Bearings.** Use woven PTFE material. Do not use weathering steel for any of these components. Design and use materials consistent with limitations and criteria from AASHTO's "LRFD Bridge Construction Specifications".

**i. Anchor Bolts.** Provide AASHTO M 314 Grade 36 or Grade 55 anchor bolts that comply with **DIVISION 1600**. When specified on the Contract Documents, provide anchor bolts, nuts, and washers that have been hot dip galvanized in accordance with ASTM F 2329.

### 1701.3 TEST METHODS

As specified in the various AASHTO and ASTM standards cited in this specification.

### 1701.4 PREQUALIFICATION

None required.

### 1701.5 BASIS OF ACCEPTANCE

**a. Plain Elastomeric Pads.** Receipt and approval of a Type D certification as specified in **DIVISION 2600**.

**b. Bearings** (all types except Steel) Accepted on the basis of the following:

(1) Receipt and approval of a Type A certification as specified in **DIVISION 2600**.

(2) Receipt and approval of a certification from the bearing producer describing the results of a visual examination by QC personnel performed during the testing of AASHTO M 251, section 8.8.2. Reject bearings having cracks exceeding the criteria of section 8.8.2, having bulging that suggest poor laminate bond, or bulging patterns that imply laminate placement does not meet the tolerance requirements of M 251, section 6. Include the following with the certification:

(a) A statement certifying the bearings conform to the design, material, and manufacturing requirements of this specification.

(b) High resolution pictures of all four sides of the loaded bearing. Take the pictures from an angle and distance, using appropriate lighting, to clearly indicate the amount of bulging and bulging patterns.

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- (c) A detailed description of any surface cracks
- (3) Visual inspection for condition and compliance with the shop drawings by the Field Engineer at the project site.

**c. Steel Bearings.** Accepted on the basis of the following:

- Receipt and approval of a Type A certification as specified in **DIVISION 2600** for all steel components provided through this specification.
- Visual inspection for compliance with the shop drawings and fabrication requirements of **SECTION 705** at either the point of production, at the bridge fabricator's facility, or at the project site, as determined by the Field Engineer.